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AHA-1740A/1742A/1744
EISA-to-Fast SCSI
Host Adapter

User's Manual

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You can write to Adaptec at:

Adaptec, Inc.
Technical Support
691 South Milpitas Blvd.
Milpitas, CA 95035

If you would prefer to contact us by FAX, our number is (408) 262-2533.

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Preface

This User Guide provides information relating to the operation of the Adaptec AHA-1740A/1742A/1744 EISA-to-Fast SCSI Host Adapter in an EISA (Extended Industry Standard Architecture) system.

Chapter One, *Overview*, provides general information and a list of files provided for configuration.

Chapter Two, *Hardware Installation*, describes the installation of the AHA-1740A/1742A/1744 host adapter in your EISA system.

Chapter Three, *Using the Configuration Utility*, contains information on configuring the host adapter with a configuration utility.

Chapter Four, *Multiple Host Adapter Support*, explains how more than one host adapter can be used in an EISA system.

Chapter Five, *Adaptec Download Utility*, explains firmware download procedure, which is available for the AHA-1740 and AHA-1744 only.

Chapter Six, *Host Adapter BIOS Operation*, explains the standard and enhanced BIOS operation modes.

Chapter Seven, *Troubleshooting*, offers information relating to the LED functioning and possible problem occurrences during host adapter operation.

Appendix A, *Disk Drives Over 1 Gigabyte*, contains configuration information relating to disk drives with a capacity of more than
1 Gigabyte.

Appendix B, *Loading the I/O Operating Environment Software*, contains a description of software used to connect more than two fixed disk drives.

Conventions

The following typographic conventions are used throughout this *Installation Guide.*

bold
Used for keystrokes (.. press the **Enter** key ..) and screen selection fields (.. select **Backup Device** and ..).

Helvetica
Used for operator entry that must be typed exactly as shown (.. device=c:\cdrom\cdrom.tsd ..) and for screen messages (.. Enter Password ..).

Helvetica Italics
Used as a place holder for text you must determine and type in (.. enter *nn* for number ..). Also used for program and file names in body text (.. the *autoexec.bat* file ..).

Italics
Used for emphasis (.. is *only* supported ..) and document reference (.. refer to Chapter 2, *Installation* ..).

ALL CAPITALS
Used for acronyms, such as SCSI.

Hexadecimal Numbers
Are followed by an 'h', e.g., 330h.

End Mark
The ❐ symbol marks the end of text for each chapter.

❐

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Chapter One
Overview

This *User Guide* provides software installation information for the Adaptec AHA-1740A, 1742A, and the 1744 EISA-to-fast-SCSI bus master host adapters. Cumulatively the cards are referred to as AHA-1740A/1742A/1744 in this guide. The Adaptec *adl.exe* download utility and the *ASW-C174* and *ASW-M174* software packages are described, as well as available software support.

General Product Information

The AHA-1740A/1742A/1744 provides a high performance connection between the EISA (Extended Industry Standard Architecture) bus and the SCSI (Small Computer System Interface) bus. The AHA-1740A/1742A are *single-ended* SCSI host adapters that support single-ended disk drives. Single-ended host adapters and devices can support cable lengths of up to 6 meters (about 18 feet). Most of the SCSI drives on the market today are of this type. The AHA-1744 Host Adapter is a *differential* SCSI host adapter that supports differential type SCSI devices. The use of differential SCSI drives and adapters allows the SCSI cable length to be up to 25 meters in length (about 75 feet). Other than this basic difference, and other slight differences discussed in this document, the AHA-1740A/1742A/1744 are installed and operate identically.

The AHA-1740A/1742A/1744 is a bus master device and transfers data into host memory at burst rates of 33 MBytes/sec. These transfers are generally 32 bits wide, unless transferring data into 8- or 16-bit memory. This form of transfer is known as bus master DMA (Direct Memory Access). Bus mastering minimizes host CPU overhead, since the AHA-1740A/1742A/1744 has an on board processor to transfer data directly to memory. This is the highest performance type of data transfer available for the EISA bus in multitasking operating systems.

The AHA-1740A/1742A/1744 supports asynchronous, synchronous, and Fast SCSI data transfers on the SCSI bus. Asynchronous data transfers support up to 2 MBytes/sec, synchronous transfers support up to 5 MBytes/sec, and Fast synchronous transfers support up to 10 MBytes/sec. Devices using different transfer rates can all be used on the same SCSI cable. The AHA-1740A/1742A/1744 is both SCSI-1 and SCSI-2 compatible, and supports both SCSI-1 and SCSI-2 devices.

The AHA-1740A/1742A/1744 fully supports the SCSI features of *disconnect/reconnect*, *zero latency reads*, and *tagged queuing*. Disconnect/reconnect support maximizes SCSI bus utilization for multiple target systems. Zero latency reads and tagged queuing minimizes the mechanical limitations of SCSI fixed disk drives.

The AHA-1740A/1742A/1744 has an on board BIOS that allows it to be used in addition to, or in place of, a standard fixed disk controller. Thus, up to two SCSI fixed disk drives can be used under DOS without the use of device drivers. Up to seven SCSI fixed disk drives can be used without a driver if MS-DOS 5.0 or higher is used. Booting is also supported by the BIOS in the DOS environment.

The AHA-1740A/1742A/1744 fully supports *scatter/gather*, a feature utilized by device drivers to minimizes the number of I/O commands into memory. The UNIX®/XENIX® and NetWare® operating environments take advantage of this feature.

The AHA-1740A/1742A/1744 has two modes of operation: standard mode and enhanced mode. The standard mode is software compatible with the AHA-1540 series host adapter drivers. The enhanced mode uses an advanced, high performance mailbox interface and features full EISA 32-bit addressing. The AHA-1740A/1742A/1744 in enhanced mode can support up to 4 Gigabytes of host RAM memory, while standard mode is limited to 16 MBytes of host RAM. The operation mode of the AHA-1740A/1742A/1744 is selected by running the EISA Configuration utility program provided with every EISA machine. The modes of operation are fully described in Chapter 6, *Host Adapter BIOS Operation*.

The AHA-1744 microcode is stored in an EEPROM. This allows the microcode to be changed with the Adaptec *adl.exe* program. The *adl.exe* program can also be used to determine the checksum of the currently installed microcode and low-level format SCSI fixed disks. Both the standard and enhanced mode microcode can reside in the EEPROM at the same time.

The AHA-1740A/1742A uses an EPROM for the microcode, which does not allow the microcode to be changed. However, the *adl.exe* program can still be used to low-level format fixed disk drives.

The AHA-1740A/1742A/1744, like all EISA I/O cards, do not have jumpers to change various configuration options. These options are changed via the EISA Configuration utility provided with every EISA system. The AHA-1740A/1742A/1744 does have a jumper that is used to determine whether or not the host adapter will supply terminator power to the SCSI bus. In addition, the AHA-1742A has a jumper that is used to enable or disable the on-board floppy controller.

The AHA-1740A/1742A/1744 can be used to install up to 7 SCSI devices. Up to 56 devices can be installed if bridge controllers are used; however, this is not usually done.

The AHA-1740A/1742A/1744 supports processor target mode, which allows the host adapter to be an initiator and a target. The use of processor target mode is fully documented in the *AHA-1740A/1742A/1744 Technical Reference Manual.*

Installation Software

Software required to install the AHA-1740A/1742A/1744, in an
EISA system, is provided in the ASW-C174 software package.
The files consist of:

Table 1-1. AHA 1740A/1742A/1744 Program Files

File Name	File Description
!adp0000.cfg	EISA configuration file for the AHA-1740A/1742A/1744
!adp0001.cfg	EISA configuration file for the AHA-1740A
!adp0002.cfg	EISA configuration file for the AHA-1742A
!adp0400.cfg	EISA configuration file for the AHA-1744
adp0000.ovl	Configuration overlay file
adp0000.ovr	Configuration overlay file (for use with the AMI EISA configuration utility)
adl.exe	Adaptec download utility
standard.hex	Standard mode microcode (AHA-1744 only)
enhanced.hex	Enhanced mode microcode (AHA-1744 only)
sys$err.dta	Support files for adl.exe
sys$help.dta	Support files for adl.exe
sys$msg.dta	Support files for adl.exe
firmhlp.hlp	Support files for adl.exe

The ASW-M174 includes only the standard and enhanced mode
firmware, and is used to upgrade the firmware for the AHA-1744
if required.

Also required to install the AHA-1740A/1742A/1744 is an EISA
Configuration utility. This utility is provided by the EISA system
manufacturer.

BIOS Operation Modes

The AHA-1740A/1742A/1744 has two modes of operation: stand-ard mode and enhanced mode. The standard mode is software compatible with the AHA-1540 series host adapter drivers. The enhanced mode uses an advanced, high performance mailbox interface and features full EISA 32-bit addressing. The AHA-1740A/1742A/1744, in enhanced mode, can support up to 4 Gigabytes of host RAM memory. The two modes of the AHA-1740A/1742A/1744 are selected by running the EISA Con-figuration utility provided with every EISA machine. In general, the enhanced mode of the AHA-1740A/1742A/1744 should be used, whenever possible, for maximum performance.

The two operation modes are described in the table below.

Table 1-2. AHA 1740A/1742A/1744 Operation Modes

Standard Mode (ISA compatible mode)	Enhanced Mode (enhanced mailbox interface)
32-bit host transfers at 33 MBytes/sec.	32-bit host transfers at 33 MBytes/sec.
Addresses up to 16 MBytes host RAM.	Addresses up to 4 Gigabytes host RAM.
AHA-1540 series mailbox structure (compatible with AHA-1540 software).	New high performance mailbox structure.
Supports Fast SCSI devices up to 5 MBytes/sec.	Supports Fast SCSI devices up to 10 MBytes/sec.
Boot only from SCSI ID 0.	Boot from any SCSI ID.
Drives spin up only at power-on.	Drives spin up at power-on, or from SCSI Start Unit command.
Disconnect/reconnect, parity checking, and synchronous negotiation enable or disabled for all SCSI targets.	These parameters can be enabled or disabled on a per target basis.
Up to four host adapters can be in-stalled in the system.	Up to twelve host adapters can be installed in the system.
BIOS support for drives up to 1 Gi-gabyte in capacity under MS-DOS.	BIOS support for drives up to 8 Gigabytes in capacity under MS-DOS 5.0 or higher.
BIOS support for a maximum of 2 SCSI drives.	BIOS support for up to 7 SCSI drives (using MS-DOS 5.0 or higher).

System Caching Description

The AHA-1740A/1742A/1744 fully supports operating systems caching to maximize overall system performance. Having RAM on the host adapter can actually decrease overall system performance while adding cost. Operating systems such as Novell® NetWare, OS/2®, UNIX, XENIX, DOS and Windows™ have built-in cache and caching the same data in the operating system and on the host adapter can bog down system performance.

Overall system performance is increased by increasing the size of the operating system cache (i.e. add more RAM to the system motherboard), and by utilizing the advanced multithreading features of SCSI to minimize the mechanical limitations of SCSI peripherals (such as disk seek times by using zero latency reads).

Product Specifications

The following table lists some of the physical product descriptions relating to the AHA-1740A/1742A/1744 Host Adapters.

Table 1-3. AHA-1740A/1742A/1744 Product Specifications

Physical Dimensions	
Length	13-3/8 inches
Width	5/8 inch
Height	5 inches
Standard EISA-compatible form factor	
Power Requirements	
+ 5.0 +/- 0.25 Volts at 2.9 Amps (maximum)	
Environmental Requirements	
Temperature -40° - 75° C (operating or storage)	
Reliability Information	
Mean Time Between Failures (MTBF): 100,000 hours (calculated per Mil Handbook 217E, ground benign, 40 C)	
Mean Time Between Failures (MTBF): (calculated)	
1740A	60,462 hours
1742A	57,600 hours
1744	54,856 hours
Mean Time To Repair (MTTR): 30 minutes	

Associated Documentation

The following documentation is also available for the
AHA-1740A/1742A/1744:

- **Installation Guide**
  This includes basic installation information in this book-
  let. The download utility *adl.exe* is also described.

- **Technical Reference Manual**
  It includes a detailed description of the host adapter,
  including jumper information, mailbox interface descrip-
  tion, and troubleshooting hints. Both the standard mode
  and enhanced mode are described in detail. If designing
  to the mailbox interface or target mode of the AHA-
  1740A/1742A/1744, then this document is recommended.

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Chapter Two

Hardware Installation

Unpacking and Inspection

The carrier is responsible for damage incurred during shipment. In case of damage, have the carrier note the damage on both the delivery receipt and the freight bill, then notify your freight company representative so that the necessary insurance claims can be initiated.

After opening the shipping container, use the packing slip to verify receipt of the individual items listed on the slip. Retain the shipping container and packing material for possible later reuse should it be necessary to return the equipment.

> Note
> The AHA 1740A/1742A/1744, like all electronic equipment, is static sensitive. Please take the proper precautions when handling the board. Keep the board in its conductive wrapping until it is configured and ready to be installed in your system.

Preparation

The configuration options for the AHA-1740A/1742A/1744 can be selected from software. Therefore, jumpers do not need to be checked before installing the AHA-1740A/1742A/1744 into the EISA system.

One exception is the AHA-1742A, since it contains an on-board floppy controller. The on-board floppy controller is shipped with a jumper installed at J6, position 6, floppy enabled. If the floppy controller on the AHA-1742A is not used, this jumper should be removed. Only one floppy controller per EISA system can be enabled.

The AHA-1740A/1742A/1744 has a jumper that can be changed. This is the jumper block labeled J4, near the external connector. This determines whether or not the AHA-1740A/1742A/1744 will provide termination power to the SCSI bus. By default, the jumper is installed and termination power is provided by the host adapter. In general, the host adapter should always supply termi-nator power. However, no more than five SCSI devices should be configured to supply terminator power to a single SCSI bus.

SCSI Terminators

The SCSI bus must be terminated correctly to ensure proper op-
eration. Only the first and last device on the SCSI bus (cable)
should have the terminating resistors installed. All other SCSI
devices should have the terminating resistors removed. The fol-
lowing figure shows two examples of SCSI device connections to
the AHA-1740A/1742A/1744 Host Adapter.
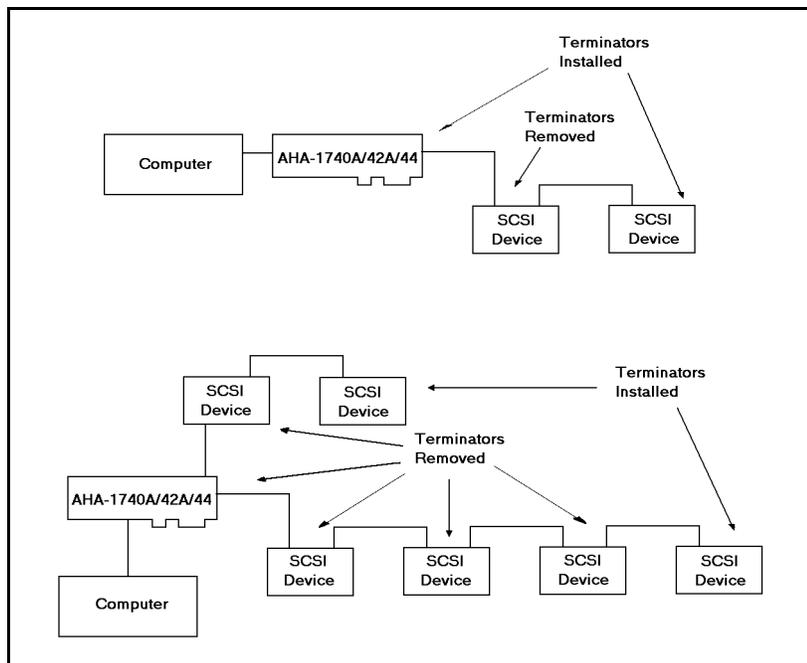


Figure 2-1. SCSI Device Termination

The AHA-1740A/1742A/1744 is a SCSI device, and has socketed
on-board terminators that should be removed if both the internal
and external host adapter connectors are used. These can be rein-
stalled at a later time, if desired. On the AHA-1740A/1742A re-
move the RN5, RN6 and RN7 terminators. On the AHA-1744
remove the RN2, RN4 and RN5 terminators.

The RN5, RN6 and RN7 terminators on the AHA-1740A/1742A are 150 ohm terminators. The RN2, RN4, and RN5 terminators on the AHA-1744 are 330 ohm terminators. If the terminators are removed and installed again in the AHA-1744, be sure to put the 8-pin terminators in the 8-pin sockets and the 10-pin terminators in the 10-pin sockets.

All SCSI peripherals have a way to add or remove termination. On some devices terminating resistors must be installed or removed. On others, only a switch need be toggled. Consult the user manual for the particular SCSI device.

SCSI Parity

The AHA-1740A/1742A/1744 always generates SCSI parity. SCSI parity checking can be enabled or disabled via the EISA Configuration utility. If any attached SCSI device does not generate SCSI parity, then parity checking for that device should be disabled.

SCSI ID

All SCSI devices have a parameter known as SCSI ID. The valid values are:

    0, 1, 2, 3, 4, 5, 6, 7

This parameter is changed via jumpers or switches on most SCSI peripherals. The SCSI ID of the AHA-1740A/1742A/1744 is 7 (highest priority) and can be changed via the EISA Configuration utility provided with the EISA system. The SCSI ID of the host adapter is almost never changed from 7.

All attached SCSI devices must have a unique SCSI ID. If the AHA-1740A/1742A/1744 is set to standard mode, the boot SCSI disk drive must be set to 0.

Physical Installation in the System

The following steps should be followed to install the
AHA-1740A/1742A/1744 into the system:

1. Turn OFF the power to the computer system.

2. Remove the system cover according to the directions of
    the computer manufacturer.

3. If only an external SCSI subsystem is used, no internal ca-
    bling is required. If an internal SCSI peripheral is used,
    install a 50-pin SCSI ribbon cable to the host adapter.
    This cable must be oriented correctly. Pin 1 of the SCSI
    cable is designated by a red strip. Multicolor 50-pin rib-
    bon cables signify pin 1 with a brown color. Pin 1 on the
    host adapter 50-pin SCSI header is located on the left-
    hand side, farthest from the installation bracket and is
    designated by the words *PIN 1* on the board adjacent to
    the header. After locating pin 1 on the host adapter and
    on the SCSI cable, carefully insert the connector located
    at the end of the long end of the cable into the host adapt-
    er connector. After ensuring that all pins are lined up
    and that the pin 1 orientation is correct, firmly seat the
    connector to the board.

4. After installing the SCSI cable, the host adapter can be in-
    stalled in any one of the 32-bit slots available in the host
    computer. Some slots in EISA machines do not support
    EISA bus mastering. The AHA-1740A/1742A/1744 can-
    not be used in such slots. If the AHA-1740A/1742A/1744
    is accidentally installed in such a slot, the EISA Configu-
    ration program will report an error. A different slot must
    be chosen for the AHA-1740A/1742A/1744.

5. If an internal SCSI device is to be used, it should be in-
    stalled in the drive bays in accordance with the directions
    on the peripheral. The proper power supply must be con-
    nected to the SCSI peripheral device.

6. The 50-pin SCSI ribbon cable can now be attached to each SCSI device. Refer to the device's installation instructions to ensure proper pin 1 orientation. Pin 1 orientation must be consistent throughout the system. Keep the ribbon cable neatly dressed away from the ventilation slots in the computer system. Keep the ribbon cable dressed away from possible electrical noise sources or noise sensitive components, particularly large microprocessors, memory boards, switching power supplies, and analog data acquisition boards. If the internal configuration requires the cable to come near noise sensitive circuits, make sure that the cable crosses the boards at right angles and is near the noise sensitive circuits for the shortest distance possible.

WARNING
The AHA-1740A/1742A requires single-ended devices. The AHA-1744 requires differential devices. Failure to match drive types can result in electrical damage to the host adapter and the peripherals.

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7. Carefully reinstall the cover of the computer.

8. If an external SCSI subsystem is to be installed, it can now be cabled to the external SCSI connector projecting from the shielding bracket on the back of the AHA-1740A/1742A/1744 Host Adapter. The proper shielded SCSI cable must be used for proper operation. The external connector on the AHA-1740A/1742A/1744 is a 50-pin high density type connector that ensures correct pin 1 orientation on the host adapter. The subsystem, cables, and SCSI terminators must be installed in accordance with the directions provided with the external SCSI subsystem. The addresses selected for external SCSI devices must not overlap with the addresses of the host adapter or any other SCSI devices attached internally.

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Chapter Four

Multiple Host Adapter Support

The AHA-1740A/1742A/1744 supports more than one host adapter in the system. The maximum number of host adapters supported depends on the operating mode of the host adapter.

Standard Mode

An EISA system can support up to a maximum of four AHA-1740A/1742A/1744 adapters in standard mode; limited by the four available DMA channels: 0, 5, 6 and 7. The host adapters must be set to unique Interrupt channels (IRQ), DMA channels, I/O port addresses, and BIOS addresses.

Enhanced Mode

An EISA system supports up to a maximum of twelve AHA-1740A/1742A/1744 adapters in enhanced mode; limited by the number of available EISA bus master supporting slots. Each AHA-1740A/1742A/1744 installed in enhanced mode by default shares IRQ 11. This value can be changed with the MCS EISA Configuration utility by selecting the **Host Adapter Interface Mode** and pressing **Cntrl** + **R** key combination to view system resources (see Figure 3-3). Each AHA-1740A/1742A/1744 can be set to a unique IRQ to maximize system performance. The IRQ cannot be changed with the AMI EISA Configuration utility (*cfg.exe*) or the Phoenix EISA Configuration utility (*ptlecu.exe*).

Standard and Enhanced Modes

In general, the host adapter SCSI ID does not need to be changed from the default of 7. Even if two host adapters are installed in the same computer, each would have its own SCSI bus (cable), and thus each host adapter would still be set to SCSI ID 7.

This value should only be changed if more than one host adapter is on the same SCSI bus (cable). This could occur in an application that utilizes the target mode of the AHA-1740A/1742A/1744.

Unlike previous Adaptec SCSI host adapters, the use of multiple host adapter BIOSs can be enabled on your system. If any configuration options for the SCSI Device Configuration are changed with the EISA Configuration utility, then the BIOS for that host adapter should be enabled; the host adapter BIOS reads that configuration information from the EISA CMOS. If the AHA-1740A/1742A/1744 BIOS is disabled, all configuration options are set to the default values shown in Figure 3-5 and 3-6.

Any valid BIOS in the system is installed in an order of priority. The lowest BIOS address has the highest priority. For example, a host adapter BIOS at address CC000h would be loaded before a host adapter BIOS at address DC000h.

The Adaptec ASPI™ software supports multiple host adapters. Consult the ASPI software user manual for proper loading of device drivers with multiple host adapters.

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Chapter Five

Adaptec Download Utility

The Adaptec Download utility (ADL) is used to download a different version of the microcode software to the AHA-1744. This chapter describes the operation of the program which affects only the AHA-1744; the AHA-1740A/1742A do not support microcode reprogramming. Although this guide does not cover the AHA-1740 operation references are made to the host adapter, in this chapter, because of the similarity in operation with the *adl* program. The *adl.exe* program can also be used to low-level format, verify or erase the boot sector of SCSI fixed disk drives connected to the AHA-1740A/1742A/1744.

Using this program to download the microcode is not necessary when the host adapter is initially installed. The host adapter is shipped with the standard mode and enhanced mode firmware, which can coexist in the host adapter. You use the EISA Configuration utility to change the operation modes of the AHA-1744.

The *adl* program is run by selecting the *adl.exe* file. As you use the *adl* program, online help is always available by pressing the **F1** key.

Running the ADL Program

When running the *adl* program, ensure that the following support files are in the same sub-directory.

- *sys$err.dta*   Support files for *adl.exe*

- *sys$help.dta*   Support files for *adl.exe*

- *sys$msg.dta*   Support files for *adl.exe*

- *firmhlp.hlp*   Support files for *adl.exe*

Also ensure that the following microcode files are present.

- *standard.hex*   Standard mode microcode

- *enhanced.hex*   Enhanced mode microcode

To run the program, type adl. The first screen displays.


```
AHA-1740 FAMILY UTILITY  VER 3.0              Friday  May 22, 1992  2:20 pm
(C) Copyright Adaptec 1991.



   LIST OF HOST ADAPTER(S)
  Slot #3   Enhanced Mode




                <F1> Help     <ESC> Exit     <ENTER> Select
```
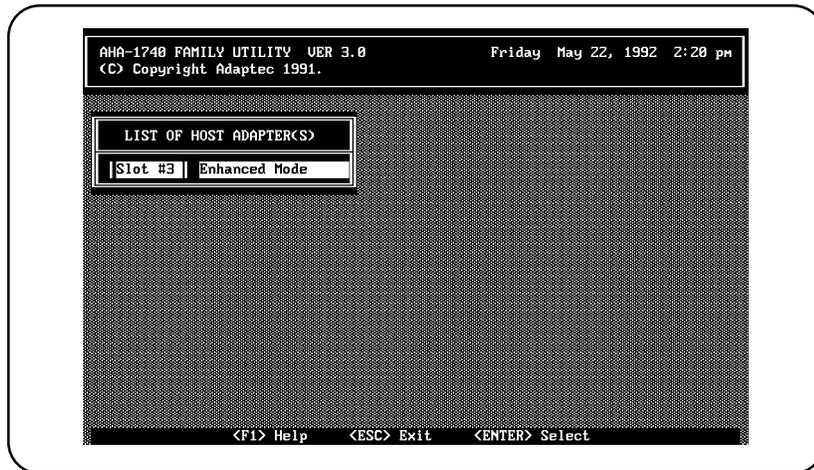
Figure 5-1. Host Adapter Listing

If the program does not properly display on a monochrome or
VGA monitor, you can type:

    adl /m or adl /mono

to run the program in monochrome mode. If the screen does not
display properly try typing:

    mode bw80

before running the *adl* program.

The installed host adapters are displayed. In this example, one AHA-1744 is installed in slot 3. It is currently set to enhanced mode. Both standard mode and enhanced mode firmware can be downloaded, regardless of the current operation mode of the AHA-1744.

Select the desired host adapter and press **Enter**. The **Main Menu** displays.


Figure 5-2. ADL Main Menu

Three options are available and each option is described in the following sections:

- Download Firmware

- Firmware Information

- Low-Level Format

Download Firmware

After selecting **Download Firmware**, the next screen displays.


```
AHA-1740 FAMILY UTILITY  VER 3.0          Thursday  May 28, 1992  2:32 pm
(C) Copyright Adaptec 1991.

  LIST OF HOST ADAPTER(S)
                              MAIN MENU
 | Slot #3 | Enhanced Mode
 | Slot #4 | Standard Mode   Download Firmware
                            Firmware Information
                            Low Level Format




            <F1> Help      <ESC> Previous Menu     <ENTER> Select
```
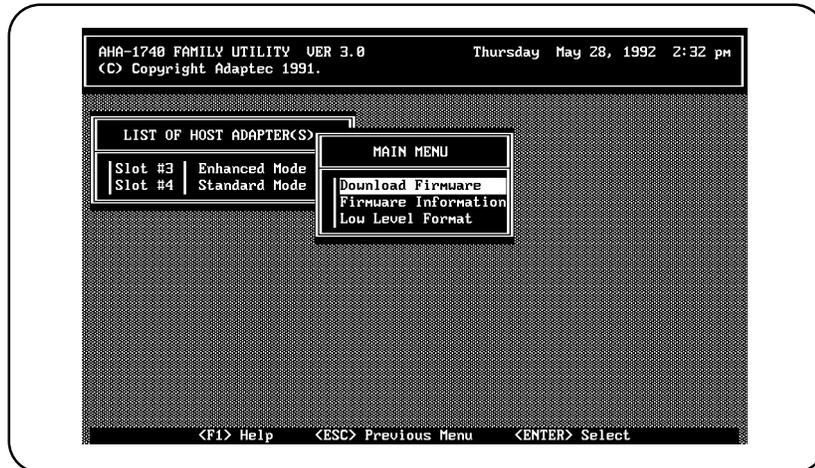
Figure 5-3. Download Firmware Screen

Enter the filename of the microcode that you are going to down-
load to the host adapter. Enter standard.hex for standard mode
and enhanced.hex for enhanced mode. The Mode field must be
set to standard to download the standard mode microcode, and
enhanced to download enhanced mode firmware. The Mode field
can be toggled by selecting the field and pressing the + or - keys.

After entering the filename, press the **Esc** key. The next screen displays.
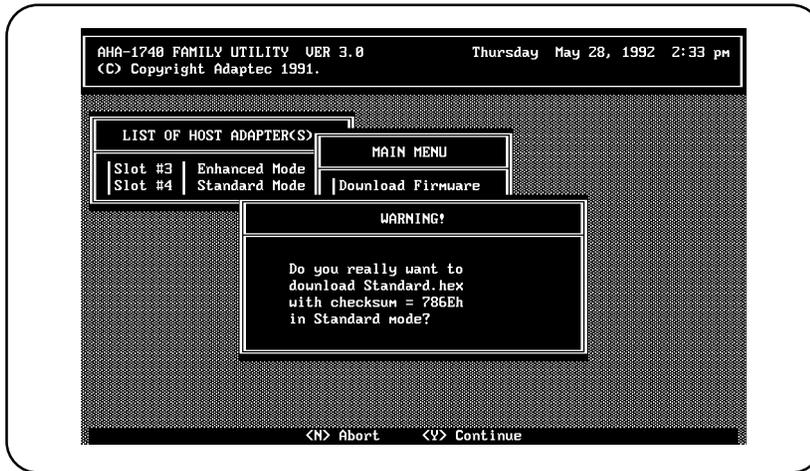
Figure 5-4. Download Warning Message Screen

The checksum of the microcode is displayed, which uniquely identifies the microcode. Select **Y** to continue with the download, or **N** to stop. The download can take up to 45 seconds to complete. Once completed, the screen displays the Download Complete message. Press **Esc** to continue.

Note
The type of firmware download (standard or enhanced) does not affect the operation mode of the AHA-1744. This can only be changed with the EISA Configuration utility.

Firmware Information

This menu option is used to display information on the installed
firmware. If the AHA-1740A/1742A1744 is operating in the stand-
ard mode, only information on the standard mode firmware is dis-
played. If the AHA-1740A/1742A/1744 is operating in the
enhanced mode, only information on the enhanced mode firmware
is displayed.

The following screen shows the enhanced mode firmware
information:.
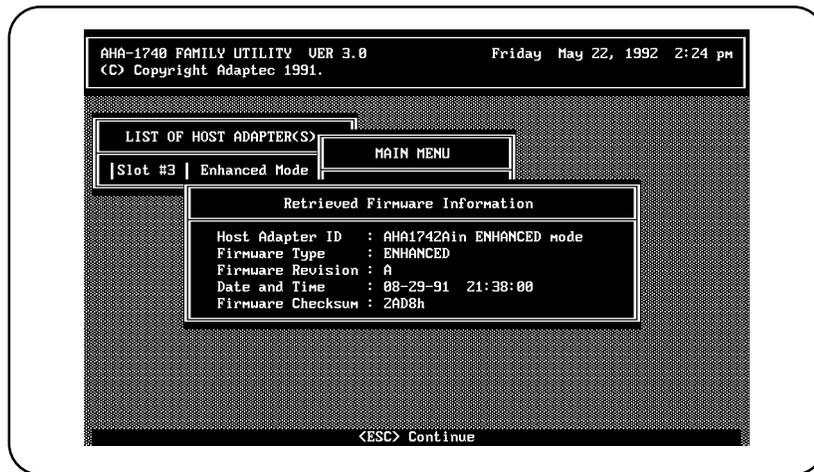
Figure 5-5. Enhanced Mode Firmware Information

Low-Level Format

This option is used to low-level format, verify, or erase the boot sector of attached SCSI fixed disks on the AHA-1740A/1742A/ 1744.

When selected, all attached SCSI devices are displayed.
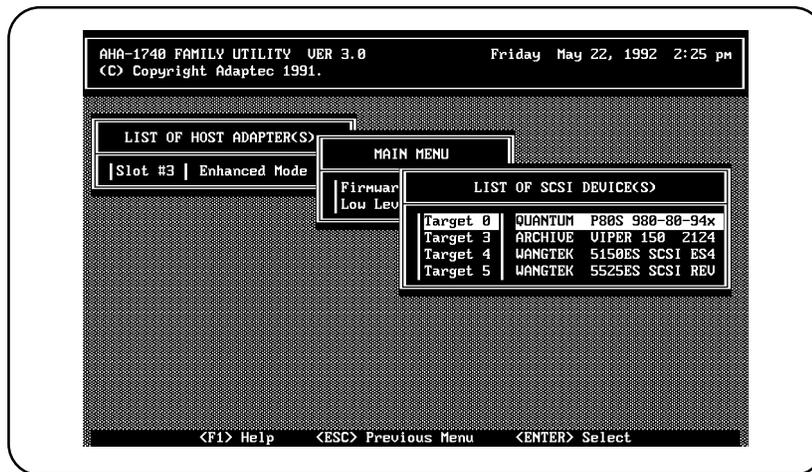
Figure 5-6. Low-Level Format Device Selection Screen

Select a device and press the **Enter** key.

The **Low-Level Format Options** screen displays.
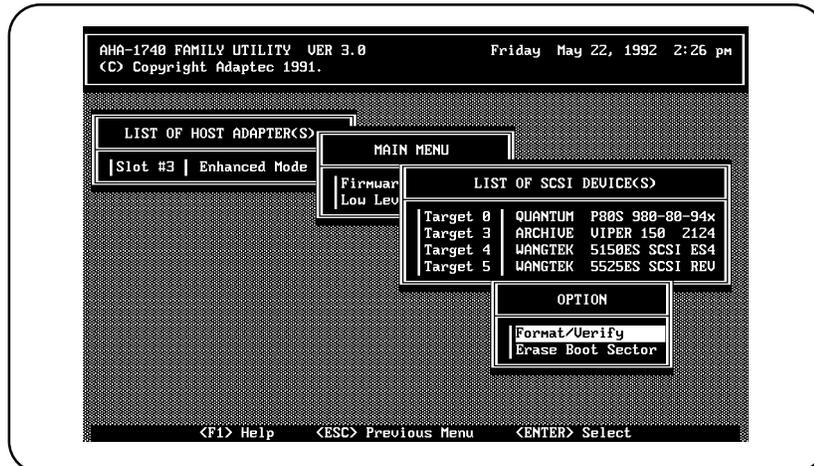
Figure 5-7. Low-Level Format Option Selection Screen

Selecting Format/Verify causes the AHA-1740A/1742A/1744 to
send a SCSI Format Unit command to the selected disk drive
which performs a low-level format of the disk. When the SCSI
Format Unit command is complete, the SCSI Verify command is
sent to verify the data on the media.

WARNING
Selecting **Erase Boot Sector** causes the host adapter card to
write data to the boot sector of the selected disk drive. This
destroys the boot record and partition table for the disk drive,
and makes any data on the disk drive unavailable.

Exiting the ADL Program

To exit the *adl* program, press the **Esc** key and the following
screen displays.
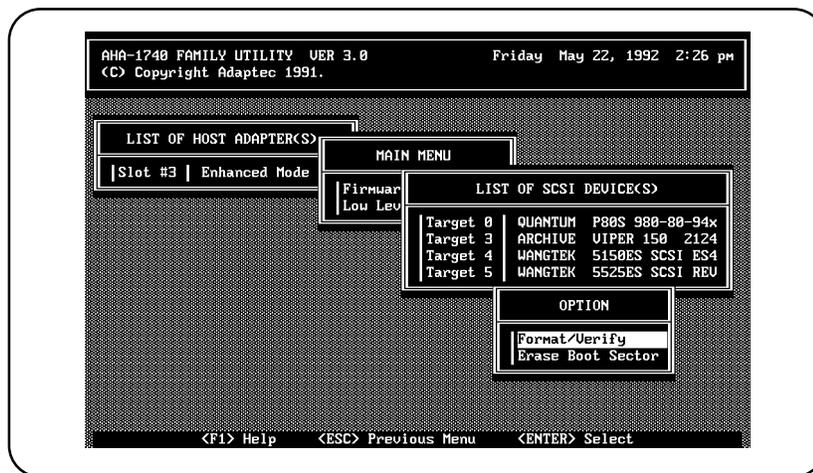
Figure 5-8. Exiting the ADL Program

Select **Yes** to exit.

Chapter Six

Host Adapter BIOS Operation

The AHA-1740A/1742A/1744 BIOS operates in two modes: standard and enhanced. The mode of operation is selected with the use of the EISA Configuration utility supplied with you EISA computer system.

Standard Mode Operation

When the adapter BIOS is operating in the standard mode, only SCSI IDs 0 and 1 are supported. The fixed disk that is configured as SCSI ID 0 is the boot disk drive. The BIOS only looks for a disk at SCSI ID 1 if a disk drive was found at SCSI ID 0 and no non-SCSI disk drives are installed.

The following message appears on the display when you boot the computer system and the standard operation mode is selected.
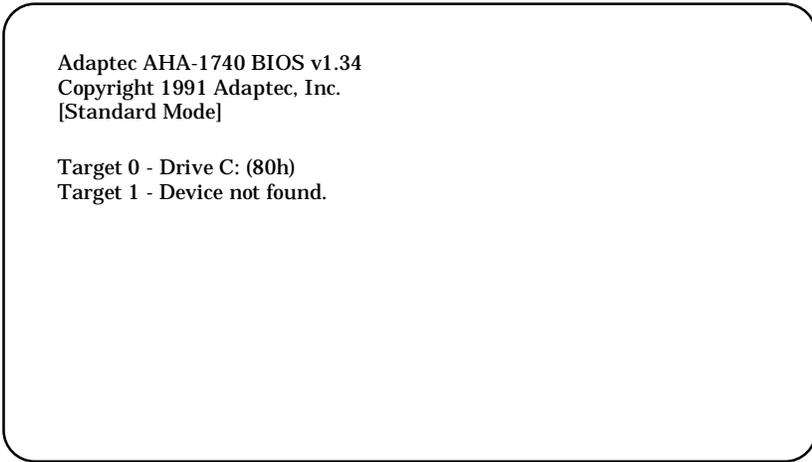
```
Adaptec AHA-1740 BIOS v1.34
Copyright 1991 Adaptec, Inc.
[Standard Mode]

Target 0 - Drive C: (80h)
Target 1 - Device not found.
```

Figure 6-1. Standard BIOS Boot Message

The BIOS version and operation mode of the AHA-1740A/1742A/1744 appear at the top of the message, followed by a list of the identified SCSI devices.

In the example shown, a SCSI fixed disk was found at SCSI ID 0 and installed as drive *C*. No SCSI fixed disks were found at SCSI ID 1. Drive *C* is also referred to as drive 80h with an interrupt of 13, which is the software interrupt for disk I/O. If a second drive were installed with a SCSI ID of 1, it would be referred to as drive *D* or 81h. Drives 82h to 8Fh are not currently supported by the adapter BIOS, so no search is made for other SCSI IDs (2 through 6) as valid disk drives.

Caution should be used when using the AHA-1740A/1742A/1744 in standard mode, since a check is not made for the type of device being installed. For example, if a SCSI tape drive is installed at SCSI ID 0, the AHA-1740A/1742A/1744 BIOS would install it as drive *C*. This would not work, since the adapter BIOS is designed to work with SCSI fixed disks only (or removable media if the media is not removed while the system is turned on).

The adapter BIOS can also install removable media devices as drive *C* or drive *D*. In general, this should not be done. The host adapter BIOS does not support the removing of media, while the computer system is operating. If the media is removed while the computer system is operating you may experience data loss. Removable media (under DOS) should be installed with Adaptec ASPI software.

Enhanced Mode Operation

The enhanced mode operation enables the adapter BIOS to iden-
tify all installed fixed disks with a valid SCSI ID.

All SCSI IDs with the BIOS support option enabled, using the
EISA Configuration utility, are scanned. The devices are
scanned, starting from SCSI ID 0 and increasing until two SCSI
fixed disks are found or all supported SCSI IDs have been
searched. Those devices found that are not valid fixed disks, such
as SCSI tape drives, CD-ROM drives, etc., will not be installed.
However, the SCSI Inquiry data, the manufacturer and model
number for these devices, is shown.

The following message appears when you boot the computer sys-
tem with the enhanced mode operation selected.

```
Adaptec AHA-1740 BIOS v1.34
Copyright 1991 Adaptec, Inc.
[Standard Mode]

Target 0  - QUANTUM      P40S 940-40-94XX - Drive C: (80h)
Target 2  - CONNER       CP340 (40mb 3.5) - Drive D: (81h)
Target 4  - CHINON       CD-ROM CDS-431
```

Figure 6-2. Enhanced BIOS Boot Message

Installed devices display the SCSI Inquiry data followed by the
drive C (80h) or drive D (81h) designation. Drives 82h through
8Fh are supported with the adapter BIOS running DOS 5 or
higher.

If Error if Device Not Found is enabled, through the EISA Con-
figuration utility, then you will see a screen similar to the one
shown below:

```
Adaptec AHA-1740 BIOS v1.34
Copyright 1991 Adaptec, Inc.
[Standard Mode]

Target 0  -  QUANTUM      P40S 940-40-94XX - Drive C: (80h)
Target 1  -  Device not found!
Target 2  -  CONNER        CP340 (40mb 3.5) - Drive D: (81h)
Target 3  -  Device not found!
Target 4  -  CHINON        CD-ROM CDS-431
Target 5  -  Device not found!
Target 6  -  Device not found!
```

Figure 6-3. Boot Message With Error Detection Enabled

By default, removable media disk drives are not installed by the
adapter BIOS. To have removable media installed by the adapter
BIOS, select the **fr** option from the EISA Configuration utility.
Generally, this should not be done. The adapter BIOS, in either
operation mode, does not support the removing of media during
system operation. If the media is removed while the system is
operating data loss could occur. Removable media (under DOS)
should be installed with Adaptec ASPI software.

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Chapter Seven

Troubleshooting

The AHA-1740A/1742A/1744 executes a self-test diagnostics when the system power is turned on or after a Hard Reset. The self-test diagnostics tests the CPU operation, performs a check-sum test on the EPROM and checks the data transfer paths on the host adapter. The host system diagnostics may perform a more extensive
diagnostics by reading and writing data to memory.

Determining Problems Using the LED

The red Light-Emitting Diode (LED) on the host adapter indi-cates the result of the self-test diagnostic. When the power is first applied to the host adapter, the LED is turned on. Under normal operation the LED turns off when the self-test diagnostics is complete. The LED remains off until the host initiates activity on the SCSI bus or I/O port. If the self-test diagnostics fails the LED will flash a code indicating the type of test failure. The LED will flash once, twice (in rapid succession) or three times (in rapid succession) followed by a longer pause to indicate the type of test failure. The flash code is repeated continuously until the host adapter is powered-off, reset, or repaired.

If you are running the self-test diagnostic for fault-isolation pur-poses disconnect the SCSI interface cable. However, ensure that at least one set of SCSI terminators are installed on the last SCSI device. If the SCSI terminators are not present the LED remains on; indicating that the AHA-1740A/1742A/1744 is receiving an active RST signal. Continuous execution of the self-test diagnos-tics on the AHA-1740A/1742A can be enabled by inserting the diagnostic jumper pair on pin 4 of jumper 6. For the AHA-1744 in-sert the jumper pair on pin 4 of jumper 5.

The following table lists the LED flash codes with the associated failure descriptions.

Table 7-1. AHA 1740A/1742A/1744 LED Flash Codes

Flash Code	Failure Description
LED Remains On	Host Adapter Control Processor failure. Terminators inoperative, missing or not powered-on or the card enable has not been asserted after reset.
1 flash	RAM test failed.
2 flashes	AIC-6251 SCSI protocol chip verification failed.
3 flashes	FIFO write/read data path test failed.
Continuous flashing	EEPROM has not been programmed (AHA-1744 only).

If any of the flash codes occur, turn the computer system OFF, remove the host adapter and inspect it for physical damage. Ensure that the EPROMs are correctly installed and firmly seated, there are no missing or damaged components, there are no broken wires, and no conductive debris is on the host adapter. If no physical damage is found, return the AHA-1740A/1742A/1744 for repair to the dealer or distributor where the host adapter was purchased.

The host adapter is cleaned and inspected and tested using a burn-in period before it is shipped. Exercise caution when handling the host adapter and keep it in the protective, conductive, wrapping until you install it. With these simple precautions, you can avoid most of the host adapter failures and damage can normally be avoided.

Problems Detected During Installation

This section may be useful to correct problems related to installation.

If the system will not boot from the floppy diskette drive after initial hardware installation, the following items should be checked:

- LED on host adapter after power-on - The LED on the AHA-1740A/1742A/1744 should come on briefly after turning the system power on. The LED should turn off when a request is sent to the host adapter.

- LED on host adapter during operation - If the LED on the AHA-1740A/1742A/1744 is always on, the orientation of the SCSI cable between the host adapter and the drive may be reversed. For the proper orientation refer to the *AHA-1740A/1742A/1744 Installation Guide*.

- If the LED begins to blink at regular intervals then the host adapter has detected an internal failure and should be returned for repair or replacement to the place of purchase. An error message may also appear on the screen.

If the AHA-1740A/1742A/1744 BIOS message does not display on the screen then the computer system is not recognizing the host adapter.

- Check the AHA-1740A/1742A/1744 BIOS address to ensure it is not conflicting with other host adapters installed in the computer system.

- Try a different BIOS address. For the proper address refer to the *AHA-1740A/1742A/1744 Installation Guide*.

- Change the BIOS wait-state jumper. For the proper jumper settings refer to the *AHA-1740A/1742A/1744 Installation Guide*.

- Try changing the BIOS address from the default of CC000h to DC000h, or some other available value.

If the following message displays:

    host adapter not found at port 330h

Check the port address setting. Verify the correct installation of the SCSI cable. An inverted or misplaced internal SCSI cable, generating a forced SCSI reset, may be causing the problem.

Problems Booting the System from a SCSI Drive

- Make sure that both standard fixed disks are mapped out of the system.

- Make sure that the SCSI boot drive address is set to SCSI ID 0:0. Check the drive installation manual for information about setting the SCSI ID for that device. The Return Installed Devices utility in the Onboard utilities can also be used to determine the SCSI addresses of peripherals on the SCSI bus.

- Make sure that SCSI parity is consistently enabled or disabled on all devices on the SCSI bus.

- Verify the proper installation and configuration of the host adapter and SCSI devices.

- Power should be cycled OFF and ON after changing any values on a host adapter, *setup* program, or SCSI device, to be sure that a DOS format operation has been successfully completed.

- Make sure that the SCSI bus is properly terminated.

- Make sure that the intended boot disk has an active DOS partition and a DOS format.

- Check the cabling.

Problems Using a SCSI and a Standard Disk Drive

The drives are configured as SCSI disk drive *D* and standard disk drive *C*.

- Make sure that the second standard fixed disk is mapped out of the system.

- Make sure that the SCSI drive to be used as drive *D* is set to SCSI ID 0:0. Check the drive manual for information on setting the SCSI ID for that device. The Return Installed Devices utility in the Onboard utilities can also be used to determine the SCSI addresses of peripherals on the SCSI bus.

- Make sure that SCSI parity is consistently enabled or disabled on all devices on the SCSI bus.

- Verify that the host adapter and the SCSI devices are properly configured and installed.

- Power should be cycled OFF and ON after changing any values on a host adapter, *setup* program, or SCSI device to be sure that the new initial values are loaded.

- Make sure that the SCSI bus is properly terminated.

- Make sure that the disk has a DOS partition and a DOS format.

- Check the cabling.

Problems Using Two SCSI Drives

The drives are configured as SCSI disk drive *D* and SCSI disk drive *C*.

- Make sure that both standard fixed disks are mapped out of the system with the *setup* program.

- Make sure that the SCSI drive to be used as drive *D* is set to SCSI ID 0:1 or 1:0. Check the drive manual for information on setting the SCSI ID for that device. The Return Installed Devices utility in the Onboard utilities can also be used to determine the SCSI addresses of peripherals on the SCSI bus.

- Power should be cycled OFF and ON after changing any values on a host adapter, *setup* program, or SCSI device to be sure that the new initial values are loaded.

- Make sure that SCSI parity is consistently enabled or disabled on all devices on the SCSI bus.

- Verify that the host adapter and the SCSI devices are properly configured and installed.

- Make sure that the SCSI bus is properly terminated.

- Make sure that the disk has a DOS partition and a DOS format.

- System works erratically, hangs, or the host adapter cannot always find the drives.

- Check SCSI parity for consistency.

- Check termination.

- Check cable length and integrity.

- If host adapter and drive LED remain on during a hang condition, make sure that the SCSI drive conforms to the *Common Command Set Revision 4B* (CCS 4B).

If only the host adapter LED remains on during a hang, it is probably a host adapter to computer system interface problem. The system may not be capable of First-Party DMA transfers. Check with the system manufacturer for information.

Some older motherboard BIOS do not support freeform data for the EISA configuration. This support is required in order to changed the default Host Adapter options. If freeform data is not supported, the AHA-1740A/1742A/1744 can still be used, but the Host Adapter option defaults will always be used.

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Appendix A

Disk Drives Over 1 Gigabyte

Extended Translation (Using DOS 5)

Adaptec host adapters have always supported the full range of disk drive sizes under all major operating systems. As disk drives have recently grown beyond 1 Gigabyte in formatted capacity, they have run up against the DOS 1024 cylinder limit.

To continue to provide support of all SCSI disk drive capacities under DOS, Adaptec has introduced extended translation for the AHA-1740A/1742A/1744. This new feature bypasses the DOS disk capacity limit and supports disk drives up to 8 Gigabytes in size under DOS, providing room for years of disk drive evolution.

The DOS 1 Gigabyte Limit

All versions of DOS are limited to 1024 cylinders of capacity per drive. The standard translation scheme for SCSI host adapters, using 64 heads and 32 sectors, provides a maximum accessible capacity of 1 Gigabyte.

To eliminate the 1 Gigabyte limit, Adaptec's new extended translation feature uses 255 heads and 63 sectors, extending the disk drive capacity limit under DOS to 8 Gigabytes.

When to Use Extended Translation

With DOS Version 5 Only

NetWare 386™ and the newer versions of UNIX do not share the 1024 cylinder limit of DOS and do not require extended translation to support large disk drives. OS/2 does not currently support extended translation.

Drives With Mixed Partitions

Do not use extended translation on drives formatted with two or more partitions for different operating systems. Use standard translation. The sum of the DOS partitions will be less than 1 Gigabyte. Partitions for UNIX and NetWare can be larger than 1 Gigabyte when using standard translation.

Note
UNIX is understood to be ATT/USL all versions, SCO v3.2.4 (or later) and ISC v3.0 (or later).

Using Extended Translation

CAUTION
If you have already partitioned a large disk drive with one translation method, conversion to another method will erase your data. Be sure to back up your disk drive prior to any change in the translation method used.

Using Fdisk

To install a new disk, or to re-partition an existing disk, use the *fdisk* DOS utility as you normally would. The cylinder size increases to 8 MBytes when you enable extended translation. The size of the partition you request must therefore be a multiple of 8 MBytes. If you request a partition size that is not a multiple of 8 MBytes, *fdisk* will round up to the nearest whole multiple of 8 MBytes.

Load ASW-1410 v3.0a

Load ASW-1410 v3.0a for ASPI support of non-disk peripheral devices. The ASW-1410 v3.0a is fully compatible with extended translation in the AHA-1740A/1742A.

Questions and Answers About Extended Translation

What happens if I enable extended translation with SCSI drives that are less than 1 Gigabyte in capacity?

Drives handled by the BIOS will use extended translation provided they are over 1 Gigabyte in formatted capacity. Drives with less than 1 Gigabyte of formatted capacity will use standard translation regardless of whether extended translation is enabled. Drives handled by the disk driver *aspidisk.sys* will continue to use standard translation and not be capable of DOS partitions over 1 Gigabyte.

What if I have more than two fixed disk drives on the AHA-1740A/1742A?

You can use up to seven fixed disk drives under the BIOS provided you are running DOS 5.0.

What if I use older versions of software drivers with extended translation enabled?

To protect your data, the host adapter will lock out any driver that does not identify itself as capable of extended translation. If you need to use software that is not compatible with extended translation, do not enable extended translation.

Adaptec's ASW-1410 v3.0a (and later) is the appropriate ASPI manager software to use with extended translation enabled.

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Appendix B

Loading the I/O Operating Environment Software

DOS/Windows

Under DOS 5.0 or higher, up to seven SCSI fixed disk drives can be connected to the 1740A/1742A/1744 without additional software. (Older versions of DOS support up to two disk drives).

The host adapter treats removable media drives as fixed disk drives provided you enable Treat Removable Disks Under BIOS as Fixed Disks in Advanced Configuration Options, and do not remove the media while your computer power is on.

Additional software is required if you desire to do the following:

- Treat removable media devices as removable while your computer is running.

- Support more than two fixed disk drives under versions of DOS prior to MS-DOS 5.0.

- Use devices other than fixed disk drives such as SCSI tape, CD-ROM, scanners, etc.

Refer to the documentation received with your operating environment software package for instructions on loading your SCSI I/O Operating Environment for versions of DOS prior to MS-DOS 5.0

Novell NetWare

NetWare 4.x includes the Adaptec I/O Operating Environment and does not require additional software.

To load software for Novell NetWare 286 2.x and 386 3.x follow the instructions included in the ASW-1440 software package.

OS/2

IBM® OS/2 2.0 and Microsoft® OS/2 1.30.1 include the Adaptec I/O Operating Environment and do not require additional software.

To use the AHA-1740A/1742A/1744 under OS/2 1.3 follow the instructions in the ASW-1220/1420 version 1.3 software product.

Unix

Major versions of UNIX include the Adaptec I/O Operating Environment and support the AHA-1740A/1742A/1744 without additional software. Current versions of SCO™ UNIX, USL UNIX®, and Sunsoft Interactive UNIX® support the AHA-1740A/1742A/1744.

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Glossary

Adapter Command
A command transmitted to the host adapter using the Command Data Out Port and the Data In Port. The commands are sequenced using the Control Port, the Status Port, and the Interrupt Flag Port. Abbreviated as IOCP command.

AEN
See Asynchronous Event Notification

AHA-1540
Adaptec host adapter for connecting SCSI devices to the PC-AT® backplane bus. The AHA-1740A/42A/44 is an enhanced version of the AHA-1540.

AHA-1540B
The enhanced high-performance Adaptec host adapter for connecting SCSI devices to the PC-AT backplane bus.

AHA-1542B
The enhanced high-performance Adaptec host adapter for connecting SCSI devices and standard IBM-compatible floppy disk devices to the PC-AT backplane bus.

AHA-1740A/42A/44
Either the AHA-1740A, 1742A or the AHA-1744.

ASPI
Advanced SCSI Programming Interface. A software architecture which permits device modules to migrate across different hardware by communicating with the hardware through a pass-through interface to a manager written to the specific hardware.

Asynchronous Data Transfer
Data transfer performed by the SCSI interface involving the interlocking of a signal to the initiator (REQ) and a signal to the target (ACK) such that each step of the data transfer protocol must occur before the next step can begin. Characterized by a low data

rate and independence of external timing constraints, including cable length and circuit response times.

Asynchronous Event Notification
A process by which a target can send unsolicited sense information to an initiator using the Send command in order to inform the initiator about the occurrence of an important unusual occurrence.

AT Bus
The Industry Standard Architecture bus.

Bus Device Reset
A SCSI message that clears all activity in the target to which it is addressed.

Byte
An eight-bit unit of data. An octet. A byte is normally the smallest addressable unit of a memory and the unit of transfer on the SCSI bus.

CCB
See Command Control Block

CCS
See Common Command Set

CDB
See Command Descriptor Block

Command Control Block
A software object prepared by the host microcomputer software for the host adapter to provide it all the control information it needs to execute a SCSI command. Abbreviated CCB.

Command Descriptor Block
A block of information passed across the SCSI bus to provide the command, parameter, and address information necessary for the target to execute the desired functions. Prepared by the host software and placed in the CCB to be passed to the target by the host adapter. Abbreviated CDB.

Common Command Set
A de facto standard SCSI command set for communication with
fixed disk drives. The Common Command Set (CCS) is the basis
for the SCSI-2 command set for all types of peripheral devices.

Configuration
The operation of configuring a device on the EISA bus through
access of registers in the device by the host. It replaces the
method of using jumpers common on ISA bus devices.

Control Microprocessor
An integrated circuit computer used to execute the software that
controls the host adapter's operation.

Device Driver
A program that is linked with, or attached to, an operating sys-
tem to map the software interface of the operating system to the
requirements of attached peripheral devices and host adapters.
Under ASPI, the main component associated with the board is
known as a Manager.

DMA
See Direct Memory Access

Differential
A term referring to the electrical characteristics of the signals
used on the SCSI bus interface. Differential signals occupy two
conductors with a positive (+) and negative (-) polarity component
of the signal. This minimizes the effect of common mode signal
noise and allows the SCSI bus to operate reliably over greater dis-
tances at a higher speed.

Direct Memory Access
A mechanism that allows hardware control of the transfer of
streams of data to or from the main memory of a computing sys-
tem. The mechanism may require setup by the host software.
After initialization, it automatically sequences the required data
transfer and provides the necessary address information.

Disconnect/Reconnect
Disconnect is the function that occurs when a target releases con-
trol of the SCSI bus, allowing the bus to go to the Bus Free phase.

Reconnect is the function that occurs when a target selects an
initiator to continue an operation after a disconnect.

EEPROM
Electrically-Erasable Programmable Read Only Memory. An inte-
grated circuit used to store the host adapter firmware, which
allows both mode download and firmware upgrade while in-
circuit.

EISA
Extended Industry Standard Architecture. A superset standard of
the 8- and 16-bit ISA standard which allows 32 bits of data to be
transferred across the bus at up to 33 MBytes/second.

Enhanced Mode
The operation mode of the AHA-1740A/1742A/1744 to take full ad-
vantage of the addressing range and register set available under
EISA. It is not compatible with earlier revisions of ASPI manag-
ers and drivers.

EPROM
Erasable Programmable Read Only Memory. An integrated cir-
cuit used to store the host adapter BIOS.

FIFO
First In/First Out. A queuing order in which items are removed
from the queue for execution in the same order in which they are
placed in the queue. An integrated circuit that buffers data in
such a manner that each byte placed in the buffer is removed
from the buffer in the same order.

Firmware
The software that controls and manages the host adapter. It is
firm as opposed to *soft* because it is designed into the host adapt-
er and cannot be modified by the user.

Host
A microcomputer in which a host adapter is installed. The host
uses software to request the services of the host adapter in trans-
ferring information to and from peripheral devices attached to the
SCSI bus connector of the host adapter.

Host Adapter
A hardware printed circuit board that installs in a standard
microcomputer backplane and provides a SCSI bus connection so
that SCSI devices can be connected to the microcomputer. A host
adapter is *intelligent* if it has a simple high-level software inter-
face to the microcomputer. A host adapter is *dumb* if the micro-
computer must directly manage the SCSI protocol using the
microcomputer processor.

IBM PC-AT Compatible
Any computer system that emulates exactly the IBM PC-AT and
that uses an ISA backplane bus.

Industry Standard Architecture
The IBM PC-AT functions have been duplicated by a number of
manufacturers. All the IBM PC-AT compatible machines use a
backplane bus that very closely emulates the function of the back-
plane bus of the PC-AT. Because of the broad usage of this bus
structure, it has become known as the Industry Standard Archi-
tecture bus, even though there is no presently accepted standard
for the bus.

Initiator
A SCSI device that requests an operation to be performed by
another SCSI device (the target). The initiator provides all the
command information and parameters required to perform the
operation, but the details of the operation are actually sequenced
by the target.

ISA
See Industry Standard Architecture

Logical Unit
A physical or virtual device addressed through a target.

Logical Unit Number
An encoded three-bit identifier for a logical unit.

LU
See Logical Unit

LUN
See Logical Unit Number

Mailbox In
An area in main memory assigned by the host microcomputer soft-
ware for communication with the host adapter. The host adapter
places status and pointer information in entries in the Mailbox In
(MBI) to indicate to the host microcomputer what operations have
been completed or what information must be obtained from the
host microcomputer.

Mailbox Out
An area in main memory assigned by the host microcomputer soft-
ware for communication with the host adapter. The microcom-
puter software places commands and pointer information in
entries in the Mailbox Out (MBO) to indicate what operations
should be started by the host adapter.

Manager
The component of a driver which is specific to a particular board
architecture and presents a standard ASPI pass-through inter-
face for use by the peripheral-specific component of the driver,
known as a module.

MBI
See Mailbox In.

MBO
See Mailbox Out.

Multi-tasking Operation
The execution of commands in such a way that more than one
command is in progress at the same time, allowing the system to
take advantage of overlapping activities by using resources that
are temporarily not required for other operations. More than one
program or more than one portion of a program may be operating
in parallel.

PC-AT
A family of small computers sold by IBM, also called the Personal
Computer/AT family of computers. The name is trademarked by
IBM.

RAM
Random Access Memory. Memory of which any byte can be
accessed directly in a single memory cycle. Information can be
read from and written to the memory.

Scatter/Gather
A device driver feature that allows the host adapter to modify the
transfer data pointer so that a single host adapter transfer can
transfer to many segments of memory in a single transfer, mini-
mizing interrupts and overhead.

SCB
SCSI Control Block. The mechanism used in emulation mode to
transfer control information to and from the board. This is equiva-
lent to the mailbox in/out system used in standard mode.

SCSI
Small Computer System Interface.

SCSI ASC
SCSI Additional Sense Code. Byte 12 of the extended sense infor-
mation. Provides a standardized description of the condition
described by the sense information.

SCSI Device
A device attached to a Small Computer System Interface bus
cable. The device may be an initiator, a target, or capable of both
types of operation. The device may be a peripheral device, a host
device, or a device mixing both roles.

Single-Ended
A term referring to the electrical characteristics of the signals
used on the SCSI bus interface. Single-ended signals occupy a sin-
gle conductor and are references to a common ground carried on
the cable between the SCSI components attached.

Single-Threaded Operation
Operation of the computing system such that only one program
can be operating or active at a time. The computing system must
wait until all resources are available before starting an operation
and cannot start another operation until the first one is com-
pleted. No overlapping of latencies or program operation occurs.

Standard Mode
The operation mode that allows software written for the AHA-1540/1640 family to be fully compatible with the AHA-1740A/1742A/1744. The limitation is that you cannot select addresses beyond 16 MBytes or access several EISA registers.

Synchronous Data Transfer
A method of data transfer on the SCSI bus involving clocking data on to the bus with a fixed-length fixed-frequency strobe pulses. The acknowledgments may be delayed several clock periods from the data requests. Synchronous data transfer can be used only for data transmission on the SCSI bus. It is prohibited for command, message, and status transmission.

Synchronous Data Transfer Negotiation
The message exchange between the initiator and the target that allows the negotiation of the data transfer frequency and delay between requests and acknowledgments required for synchronous data transfer. Once negotiated, synchronous data transfer parameters remain unchanged until certain reinitialization activities occur.

Tagged Queuing
A SCSI-2 feature that allows the SCSI device to return data in a different order than requested by the SCSI host adapter.

Target
A SCSI device that performs an operation requested by an initiator. The target may be a peripheral device performing a service for an initiator. The target may also be a host adapter performing a processor-type device service for an initiator.

Word
A 2-byte (16-bit) unit of data.

Zero Latency Reads
A Method of minimizing mechanical limitations of fixed disk by requesting data in an unordered sequence. The data is reordered by the host adapter.

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